

### **REMARKS**

Claims 1-3, 5 and 7-23 are pending in the above-identified application. Claims 1-3, 5, 7-13 and 15-22 were rejected. Claim 14 was objected to as being dependent upon rejected base claim 1, but would be allowable if rewritten in independent form including all the limitations of the base claim 1 and any intervening claims. The Examiner did not address claim 23. With this Amendment, claims 1 and 14 are amended, claim 3 is canceled, and claim 24 is added. Accordingly, claims 1-2, 5 and 7-24 are at issue in the above-identified application.

#### **I. Allowable Subject Matter**

The Examiner stated that claim 14 would be allowed if rewritten in independent form including all of the limitations of the base claim 1 and any intervening claims. Accordingly, Applicants have amended claim 14 in accordance with the Examiner's suggestions and respectfully submit that the claim is now in condition for allowance.

#### **II. 35 U.S.C. § 102(b) Anticipation Rejection of Claims 1-3, 5, 7-8, 12, 13 and 15-22 and 35 U.S.C. § 103(a) Obviousness Rejection of Claims 9-11**

The Examiner rejected claims 1-3, 5, 8, and 15-21, of which claims 1 and 17 are independent, under 35 U.S.C. 102(b) as being anticipated by Nakayama et al., (JP 405343183). The Examiner also rejected claims 1-3, 5, 7, 12, 13, and 17-22 under 35 U.S.C. 102(b) as being anticipated by Pichler et al., (WO 9810473). In addition, the Examiner rejected dependent claims 9-11 under 35 U.S.C. 103(a) as being obvious over Nakayama as applied to claims 1 and 8, and further in view of Sony (JP 10335066). Applicants respectfully traverse these rejections.

With regard to independent claim 1, Applicants claim as amended a light-emitting device that has the following limitation, among others:

...wherein said anode [of the light-emitting device] has a visible light transmittance of 35 to 75%, said anode having a metal selected from the group consisting of Ni, Ru, Ir, Rh, Pr, Pd, Re, Zr, Nb, Mo, and W, and said anode comprises a first layer comprising a first compound selected from the group consisting of zinc, indium, and tin and a second layer comprising said metal.

Applicants teach that the second layer of the anode has a composition that includes one of the above-identified metal materials so as to maintain a high luminance of the light-emitting device while significantly improving the contrast, among other characteristics, of the light-emitting device. (Application, pg. 7 line 11 - pg. 9 line 24, pg. 11 line 5 - pg. 13 line 8). In addition, Applicants also teach and claim that the second layer of said anode has a thickness in the range of 15 nm to 80 nm (more preferably 22 nm to 80 nm to have a higher work function as well), where a luminance of the light-emitting device increases within the range of 620 to 1200 cd/m<sup>2</sup> as said thickness of said second layer is decreased within the identified range and a corresponding contrast of the light-emitting device increases within the range of 250:1 to 410:1 as the second layer thickness is decreased within the range of 15 nm to 80 nm. (Application, pgs. 18-33, Examples 1-13; pg. 46 Table 1; Fig. 6).

Nakayama discloses an organic thin film electroluminescent (El) element that has a transparent electroconductive film (ITO) 102 that serves as an anode for the element and a titanium oxide thin film (Ti) that serves as part or the whole of the hole transport layer for the element. (Nakayama, Abstract). Nakayama fails to disclose that the anode or the hole transport layer has a metal selected from the group consisting of Ni, Ru, Ir, Rh, Pr, Pd, Re, Zr, Nb, Mo,

and W. In addition, Nakayama fails to disclose that the ITO anode or the combination of the ITO and Ti hole transport layer has a visible light transmittance of 35% to 75%.

Pichler discloses an organic light-emitting device that has a anode with a first layer of a conductive oxide (that may include indium, tin or zinc) and a second layer of a high work function element or alloy such as C, Au, or Pt. (Pichler, pg. 12 line 28 - pg. 13 line 5). Thus, Pichler fails to disclose that the second of the two layer anode has a metal selected from the group consisting of Ni, Ru, Ir, Rh, Pr, Pd, Re, Zr, Nb, Mo, and W. In addition, Pichler fails to disclose that the ITO anode or the combination of the ITO and Ti hole transport layer has a visible light transmittance of 35% to 75%. Moreover, Pichler teaches that the second layer of "the anode needs to be less than 10nm" thick for the device to be semi-transparent "but preferably less than 5nm thick in order to preserve transparency." Thus, Pichler teaches away from the anode having a visible light transmittance of 35% to 75% and teaches away from the second layer of the anode having a thickness in the range of 15nm to 80nm (or more preferably 22nm to 80nm) as taught and claimed by Applicants.

Thus, neither Nakayama nor Pichler teach all the limitations of amended claim 1. Accordingly, Applicants respectfully request that the Examiner withdraw this rejection to claim 1.

With regard to independent claim 17, Applicants claim as amended a light-emitting device that has the following limitation, among others:

...an **inorganic** layer ...between an anode and a cathode wherein said anode has a visible light transmittance of 35 to 75% ...

Neither Nakayama nor Pichler disclose a light-emitting device with an **inorganic** layer and an anode that has a visible light transmittance of 35 to 75%. Accordingly, Applicants respectfully request that the Examiner withdraw this rejection to claim 17.

In addition, Claims 2, 5, 7-13, and 15-16 depend from claim 1 and should be allowable for the same reasons as Claim 1. Claims 18-23 depend from claim 17 and should be allowable for the same reasons as Claim 17. Accordingly, Applicants respectfully request that the Examiner withdraw the rejection to these claims.

### **III. Newly Added Claim**

In addition, Applicants request that the Examiner consider newly added claim 24 which corresponds to rejected claim 1 but having the following limitation, among others:

...wherein said anode has ...a first layer comprising a first compound selected from the group consisting of zinc, indium, and tin and a second layer comprising said metal, and wherein said second layer has a thickness that is greater than 20 nm and less than or equal to 80 nm.

Applicants teach a relationship between the thickness of the anode consisting of the metal (selected from the group consisting of Ni, Ru, Ir, Rh, Pt, Pd, Re, Ti, Zr, Nb, Mo, and W) and the resulting luminance and contrast of the light-emitting device. In particular, as previously mentioned, applicants teach that the second layer of said anode has a thickness in the range of 15 nm to 80 nm (more preferably 22 nm to 80 nm to have a higher work function as well), where a luminance of the light-emitting device increases within the range of 620 to 1200 cd/m<sup>2</sup> as said thickness of said second layer is decreased within the identified range and a corresponding contrast of the light-emitting device increases within the range of 250:1 to 410:1 as the second layer thickness is decreased within the range of 15 nm to 80 nm. (Application, pgs. 18-33, Examples 1-13; pg. 46 Table 1; Fig. 6).

Neither, Nakayama nor Pichler teach or suggest the above-identified relationship claimed by Applicants. In particular, neither, Nakayama nor Pichler disclose or suggest an anode having a second layer that includes a metal selected from the group consisting of Ni, Ru, Ir, Rh, Pr, Pd, Re, Ti, Zr, Nb, Mo, and W and that has a thickness greater than 20 nm but less than or equal to 80 nm so as to maintain a high luminance of the light-emitting device while significantly improving the contrast, work function, and other characteristics, of the light-emitting device. (See Application, pg. 7 line 11 - pg. 9 line 24, pg. 11 line 5 - pg. 13 line 8). While Nakayama teaches a Ti hole injection layer that is 20 nm thick, Nakayama teaches that the thickness of the Ti hole injection layer is dependent upon the thickness of the multi-film organic layer (which includes a hole injection layer, a luminous layer, and an electron-injection layer) and the optical distance between the Ti hole injection layer and the multi-film organic layer so as to maintain or increase the light intensity of the device. (Nakayama, paragraph [0012]). Thus, Nakayama fails to teach the relationship of the anode thickness to the luminance and the contrast of the light-emitting device as taught and claimed by Applicants.

As mentioned above, Pichler teaches that the second layer of the anode has a thickness of less than 10 nm, which teaches away from the above recited limitation of claim 24 and the relationship of the anode thickness to the luminance and the contrast of the light-emitting device as taught and claimed by Applicants. Thus, none of the cited references, alone or in combination, teach a light-emitting device having the above-identified limitations of claim 24. Furthermore, Applicants submit that because this new claim presents limitations from rejected claims 1 and 15, no new issues are raised. Accordingly, Applicants submit that claim 24 is in condition for allowance.

**CONCLUSION**

In view of the above amendments and remarks, Applicant submits that all claims are clearly allowable over the cited prior art, and respectfully requests early and favorable notification to that effect. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, the Examiner is invited to telephone the undersigned counsel to arrange for such a conference.

Respectfully submitted,

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By: \_\_\_\_\_  
Thomas J. Burton  
Registration No. 47,464  
SONNENSCHN NATH & ROSENTHAL  
P.O. Box 061080  
Wacker Drive Station, Sears Tower  
Chicago, Illinois 60606-1080  
(312) 876-8000

## APPENDIX A

### VERSION WITH MARKINGS TO SHOW CHANGES MADE IN CLAIMS

Please cancel claim 3 without prejudice or disclaimer.

Claims 1, 5, 14, and 15 are amended as follows:

1. (Twice Amended) A light-emitting device comprising a layer including an emission region and provided between an anode and a cathode wherein said anode has a visible light transmittance of 35 to 75%, said anode [having]has a metal selected from the group consisting of Ni, Ru, Ir, Rh, Pt, Pd, Re, [Ti,] Zr, Nb, Mo, and W, and said anode comprises a first layer comprising a first compound selected from the group consisting of zinc, indium, and tin and a second layer comprising said metal.

5. (Twice Amended) A light-emitting device according to Claim [3]1, wherein said second layer comprises a metal compound having said metal and a material selected from the group consisting of oxides, nitrides and oxide-nitrides.

14 (Amended) A light-emitting device [according to Claim 1]comprising:  
a layer including an emission region;  
an anode; and  
a cathode, wherein said layer is disposed between said anode and said cathode, and  
said anode has a visible light transmittance of 35 to 75%, a metal selected from the group consisting of Ni, Ru, Ir, Rh, Pt, Pd, Re, Ti, Zr, Nb, Mo, and W, and a dopant material selected from the group consisting of  $R_xNiO$ ,  $R_xWO_3$ , and  $TiNb_xO_y$ , wherein R is selected from the group consisting of H, Li, Na, K, Rb, Cs, Cu, Ag, and Au.

15. (Amended) A light-emitting device according to Claim [3]1, where said second layer has a thickness in the range of 15 nm to 80 nm.